University of Hawaii at Manoa

Hawaii Natural Energy Institute
Holmes Hall 246 • 2540 Dole Street • Honolulu, Hawaii 96822

January 22, 1991

Mr. Norman Hayashi
Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Hayashi:

As required in the County of Hawaii Planning Commission's geothermal resources permit (GRP 89-1), we have enclosed five (5) copies each of the December, 1990 monthly report.

If you have any questions, please call me at 522-5620.

Sincerely,

Harry Olson

Harry Olson
Hawaiian Electric Industries/
Spark Matsunaga Fellow in
Geothermal Energy Research

Enclosure: December monthly report

DECEMBER 1990 MONTHLY REPORT

Scientific Observation Hole (SOH) Program

Geothermal Resource Permit: GRP 89-1

Lilewa, Kapoho, and Halekamahina, Hawaii

TMK: 1-2-10:01; 1-4-01:02; and 1-4-02:32

Hawaii Natural Energy Institute

University of Hawaii

January 1991

SUMMARY

Drilling continued at SOH 1, from December 1 through December 23, 1990, when the operations were shut down for the Christmas break. At the beginning of the month the depth of the hole was at 4753 feet and the ending depth was 5526 feet, an interval of 773 feet. Drilling continued to be through broken rock resulting in short core runs. To insure that the hole would be in good condition to run tubing upon completion, a 2-15/16" tricone was run in the hole to ream and condition some problem intervals. Afterwards the NQ coring equipment was run back in the hole and encountered only minor obstructions. Coring progressed from 4,880 - 4,991 with a considerable improvement in downhole conditions. The rock was relatively competent permitting repeated 10 foot core runs, but below 4,991 feet broken rock was encountered shortening the core runs once again. Below 5,210 feet the rock was generally solid and competent submarine flows with minor clastic material which permitted 8-10 foot core runs. SOH 2 was granted a grading and grubbing permit on December 4, 1990 and preparation for the site is in the process of being scheduled. SOH 3 remains in the permitting stage awaiting a grading and grubbing permit. An Archaeologist has been contacted to work with the State on the requirements for the archaeological survey for the SOH 3 site. The burial of the sump material at SOH 4 is to be scheduled shortly.

I. INTRODUCTION

This document presents a monthly report to the County of Hawaii Planning Department to support the Scientific Observation Hole (SOH) program in the Kilauea middle and lower east rift zones. The SOHs are for scientific observation purposes only. The holes will not be flow-tested or produced. The information to be gained from the SOHs will provide an assessment of subsurface geological conditions, groundwater level and composition, temperature, drilling conditions, an inventory of possible mineral and geothermal resources, and an eruptive history of the island to the depth drilled.

This report addresses: occurrence and duration of any start-up, shut-down, and operation mode of any SOH/facility; performance testing, evaluation, calibration checks, and adjustment and maintenance of the continuous emission monitor(s) that have been installed; and emission measurements.

II. BACKGROUND

The County of Hawaii Planning Commission approved, on August 8, 1989, a geothermal resource permit application (GRP 89-1) to drill scientific observation Holes (SOHs) in the Kilauea middle and lower east rift zone. This document presents a monthly report, as required in condition 6:

> "The petitioner shall maintain a record in a permanent form suitable for inspection and five (5) copies shall be filed with the Planning Department on a monthly basis during drilling and for six (6) months after the completion of drilling to establish a hole specific baseline and such record shall be available to the community. The record shall include:
>
> a. Occurrence and duration of any start-up, shut-down, and operation mode of any SOH/facility.
>
> b. Performance testing, evaluation, calibration checks, and adjustment and maintenance of the continuous emission monitor(s) that have been installed.
>
> c. Emission measurements reported in units compatible with applicable standards/guidelines."

As designated, four holes are planned to be drilled along the Kilauea East Rift Zone on the Big Island of Hawaii. Three of the Big Island holes (SOHs 1, 2, and 4) are on agriculture land and have been permitted by the County of Hawaii Planning Commission. The fourth hole, designated SOH 3, is on

conservation land. SOH activities under Conservation District Use Permit (HA 12/20/85 - 1830) issued to the Estate of James Campbell have been approved.

III. SOH 1 SITE

Drilling Activity

Tonto drilling services continued drilling activities to a depth of 5526 feet for this reporting period. The drilling penetration rate improved over past report periods, reflecting an increased rock competency below 4,800 feet. Drilling activities were shut down on December 23, 1990 for the Christmas break. A security service was engaged to monitor the site while the crew was on vacation.

Monitoring Program - Air Quality

The air quality monitoring station provides a continuous record of atmospheric H_2S concentrations when interfaced with a data logger or chart recorder. The unit is located in a utility container on-site and power is provided by the drill rig system.

This station operated normally throughout the month until the shut down of the drill rig for the Christmas break. Calibrations were routine and there were no major data gaps. Total data capture was 100% (see Appendix for details).

Monitoring Program - Meteorological

Continuous wind speed and directional measurements are being

made with a recording wind speed/direction sensor system. A data logger and back-up pressure-sensitive recorder is being used to record the wind speed and direction data. The unit is located in a utility container on-site and power is provided by the drill rig system.

This station operated normally throughout the month until the rig was shut down and the power was turned off for the remainder of the month. Calibrations were routine and there were no major data gaps. Total data capture was 100% (see Appendix for details).

Monitoring Program - Noise

One noise monitoring station is located at the SOH 1 site during drilling. There was some loss of data at this station due to mechanical problems. The monitor at the Laughlin residence was installed at the SOH 1 site and full calibration was achieved. The station went off-line from December 24, 1990 until the end of the month.

A second noise station is located at the Laughlin residence, about a quarter mile west of the SOH 1 drill site. The instrument at this station was removed and installed at the SOH 1 station on December 7, 1990.

A third noise monitoring station is installed at the Pommerenk's residence, about a mile east of the SOH 1 site. This monitor is powered by solar charged batteries, which required some adjustments this month, but now seem to be functioning

normally. The loss in battery charge resulted in some data being lost, but for the majority of the month, the station operated normally at full calibration (see appendix for details).

Emissions Reports

An H_2S monitor is located on-site. The average H_2S level measured is about 1 ppb. The Colortek sensors were replaced weekly as a matter of routine and showed no indication of any emissions from the well.

IV. SOH 2 SITE

No drilling activity has been initiated. Ambient noise monitoring is being prepared for the SOH 2 site. Findings of the flora/fauna field surveys have been sent to County of Hawaii Planning Department. A permit (3801-01) has been granted by the Department of Land and Natural Resources to inspect, modify, and if practical, install a pump into an existing airstrip well to supply water for drilling operations. The start-of-construction date for the assessment of the well has been extended from October 25, 1990 to April 25, 1991. A grading and grubbing permit for this site was granted on December 4, 1990 and the clearing of the site is in the process of being scheduled.

V. SOH 3 SITE

No drilling activity has been initiated. Access to the SOH 3 site has not been constructed, nor has the site been cleared or graded. SOH 3 is scheduled to be located at the True/Mid-Pacific

alternate drill site 2 (approximately 3,000 feet north-north-west of the present drill site). All necessary reports have been submitted to DLNR for review and approval. DLNR has asked for an expanded archaeological survey. An Archaeologist has been contacted to perform the survey and is working closely with the Division of Historic Preservation to insure compliance to concerns of possible burial sites and lava tubes. DLNR has not to date made a decision regarding a medicinal plant survey, which may have to be done prior to the issuance of a grading and grubbing permit.

VI. SOH 4 SITE

Drilling Activity

Drilling completed -- no activity for this period. County of Hawaii landfill officials found the mud pit material unsuitable (too wet) for their operations; therefore, Department of Health officials have given approval to bury the material on-site. Planting of ohia seedlings (from DLNR nursery) will follow soon after.

Monitoring Program -

Air Quality, Meteorological, Noise and Emissions are not being monitored, since drilling has been completed at this site.

APPENDIX

MAINTENANCE REPORTS

ALPHA MICROSYSTEMS

1550 Akolea Place
Hilo, Hawaii 96720
(808) 935-7985

HAWAII NATURAL ENERGY INSTITUTE
Look Laboratory
811 Olomehani St.
Honolulu, Hawaii, 96813

Attn: Ms. Laura Glenn

January 6, 1991

Dear Laura,

This is the final report to Ormat for the Met and H2S stations that have been monitored by Alpha Microsystems for the past 9 years. We will continue to archive the data that has been collected to date for the next 12 months.

The reporting format for HNEI will be different in the future.

This report covers the period Dec. 1, to Dec. 31, 1990.

GILMAN HAI. This instrument operated normally throughout the month with two minor exceptions. There was a loss of 12 hours data on Dec. 2-3 due to Lead Acetate running out, and a 4 hour power outage on Dec. 9. Calibrations were routine but the instrument is getting unstable. Total data capture was 98%.

SOH-1 HAI. This Analyzer operated normally and without problems until Dec. 22 when the Drill-Rig was shut down. No electrical power. Data capture was 100% to that date.

WOODS HAI. There were no problems with this instrument until Dec. 24 when a very bad chart jam caused the loss of 45 hours data. This was caused by extreme moisture. Calibrations required substantial adjustment indicating an overhaul of the instrument would soon be necessary. Total data capture was 94%.

WOODS MET. There was substantial data loss due to both instrument failures and excessive moisture. Temperature became intermittant of Dec. 2, and failed completely on Dec. 5. There was also a loss of 57 hours data from all parameters on Dec. 24-26 due to a complete chart transport freeze-up. The wind direction sensor is now also intermittant. The housing for the Tipping-bucket rain gage is rusted out and fell apart when it was moved.

T.P. MET. There were numerous problems at this station also during December. The temperature sensor failed completely on Dec. 7, leaving only Wind Speed, Direction and Rain-fall active. Chart jams because of the excessive moisture caused loss of 25 hours data on Dec. 13-14, 34 hours on Dec. 20-21 and 82 hours on Dec. 22 to 28. This was a total data loss of 141 hours for all parameters.

SOH-1 MET. This station operated normally up to Dec. 22 when the Drill rig shut down and the power was turned off for the rest of the month.

COLORTEC. The colortec cards were replaced weekly as a matter of routine and showed no visible color change.

Enclosed:

H2S Data Reduction for Gilman, SOH-4 and Woods Stations for December 1990.
Average, Maximum and total H2S for the above stations.

Meteorological Data Reduction for Woods, T.P., and SOH-1. December 1990.

Synopsis of Woods and T.P. Met Data for December, 1990.

Copy of Station Logs, December, 1990.

December Invoice

STATION LOG

J-337 Monday, 12-3-90

SOH-1 0820 Clouds 95% WS&DIR 330 @ 3-4
Pen ran dry. Replaced. Some data lost.

POMERINCK 0902 Clouds 95% WS&DIR 300 @ 2-3
Sound meter battery dead, inoperative. Lost some data. Replaced batteries. Tested O.K.

LOUGHLIN 0936 Clouds 90% Calm
Pen ran dry. Replaced. Some data lost.

J-339 Wednesday, 12-5-90

SOH-1 0810 Clouds 25% WS&DIR 270 @ 4-5
Pen ran dry again. Replaced. Some data lost.

POMERINCK 0840 Clouds 10% WS&DIR 300 @ 6-7
Sound meter batteries dead again. Not enough sunshine recently to keep batteries charged. Replaced batteries with set charged at home.

LOUGHLIN 0920 Clouds 10% WS&DIR 335 @ 6-7
Pen ran dry again. Replaced. Some data lost.

J-341 Friday, 12-7-90

SOH-1 0800 No clouds Calm
Inoperative. On site tests indicated that the sound meter failed completely. Will take home to check. Installed meter from LOUGHLIN site. Ran full calibration and replaced pen.

POMERINCK 0840 No clouds WS&DIR 300 @ 2-3
Operating normally. Ran full calibration and adjusted meter to 110.0 from 110.2. Also adjusted recorder down 2db.

LOUGHLIN 0915 No clouds WS&DIR 350 @ 2-3
Operating normally. Removed chart. Removed sound meter to replace failed meter at the SOH-1 site. This station now off-line.

J-344 Monday, 12-10-90

SOH-1 0830 Clouds 100%, rain WS&DIR 40 @ 2-3
Operating normally, replaced pen.

POMERINCK 0855 Clouds 90% WS&DIR 50 @ 6-7
Pen ran dry. Replaced.

LOUGHLIN
Off-line.

J-346 Wednesday, 12-12-90

SOH-1 0830 Clouds 60% WS&DIR 340 @ 4-5
Pen ran dry again. Replaced. Some data lost.

POMERINCK 0900 Clouds 60% WS&DIR 325 @ 3-4
Operating normally. Batteries O.K.

LOUGHLIN
Off-line.

J-348 Friday, 12-14-90

SOH-1 0830 Clouds 100%, rain WS&DIR 120 @ 5-6

Operating normally. Replaced pen again. Caught a cockroach drinking from the pen tip as though it were a faucet. Full calibration. Meter O.K., but adjusted recorder up 1db. Renewed the chart.

POMERINCK 0916 Chouds 100% WS&DIR 90 @ 6-8

Operating normally. Replaced chart. Full Calib. No adjustments necessary for meter or recorder. Also replaced meter batteries. Not enough sun to keep them charged.

LOUGHLIN

Off-line.

J-351 Monday, 12-17-90

SOH-1 0825 Clouds 90% WS&DIR 120 @ 3-4

Pen ran dry again because cockroaches drank the ink. Some data lost. Replaced pen.

POMERINCK 0850 Clouds 80% Calm

Operating normally. Replaced main battery.

LOUGHLIN

Off-line.

J-353 Wednesday, 12-19-90

SOH-1 0810 Clouds 100%, rain WS&DIR 350 @ 3-4

Chart badly jammed. Lost data. Renewed chart and very heavily sprayed inside of instrument shelter with roach-spray. Incredible number of roaches swarmed out of the shelter. Hope this will help.

POMERINCK 0850 Clouds 100%, rain WS&DIR 325 @ 4-5

Operating normally. Installed recharged meter batteries.

LOUGHLIN

Off-line.

J-355 Friday, 12-21-90

SOH-1 0830 Clouds 100%, rain Calm

Operating normally. Replaced pen. Full calibration. No adjustments were required.

POMERINCK 0915 Clouds 100%, rain Calm

Operating normally. Replaced meter batteries. Full calibration. No adjustments to meter but recorder was down 2db.

LOUGHLIN

Off-line.

J-358 Monday, 12-24-90

SOH-1 0820 Clouds 100%, rain WS&DIR 360 @ 4-5

Inoperative. No Power. Rig shut down. Off line.

POMERINCK 0900 Clouds 100%, rain WS&DIR 360 @ 4-5

Operating normally. Replaced main battery.

LOUGHLIN

Off-line.

J-360 Wednesday, 12-26-90

SOH-1

Off-line.

POMERINCK 0857 Clouds 80% WS&DIR 300 @ 2-3

Chart badly jammed. Lost some data. Also inadvertantly left chart speed at 5 cm/hr instead of 2 cm/hr. Batteries O.K. Replaced chart.

LOUGHLIN

Off-line.

J-362 Friday, 12-28-90

SOH-1

Off-line.

POMERINCK 0835 No clouds WS&DIR 300 @ 3-4

Operating normally. Full calibration. No meter adjustment was required. Adjusted recorder 1 db down.

LOUGHLIN

Off-line.

J-365 Monday, 12-31-90

SOH-1

Off-line. Drill rig still shut down.

POMERINCK

Some data loss due to one of the Meter batteries having failed. Replaced both meter batteries and restored operation. Everything O.K.

LOUGHLIN

Off-line. Meter still at Quest for repair.

NAME EXPERIMENT NO.

T-337 Monday 12-3-90

Woods HAI Range 0-4 ppb

Flow steady @ 3.0, Removed Chart - Replaced Lead Acetate

Tygon Dry - Pump + Bubbler O.K.

Check 20.4%, down .3%

Optics 1610-1620, up 10-2, adj. to 1620-1620

Range - High 1:1 Low High Low - adj Fan 1:1

Zero Calib 14 2 -0 -2 (Zero Pot Two Right) 0

Span Calib Exp 30 50 50 50 50

Act 31 44 49 49 50

Woods Met

Operating Normally - Removed Chart - Rebalanced Rain Gage

T.P. Met

Operating Normally - Removed chart - Both @ 12.22

SOH-1 Met

Operating Normally - Removed Chart

Gilman HAI Range 0-2 ppb

Flow Steady @ 3.0, Removed Chart - Replaced Lead Acetate

Tygon Dry - Pump + Bubbler O.K.

Check 17.9%, down .2%

Optics 2000-2050, down 10-2, N/O Adj.

Range - High 1:1 Low 1:1

Zero Calib 15 10 3 0

SOH-1 HAI Range 0-2 ppb

Flow steady @ 3.0, Removed Chart - Lead Acetate O.K.

Tygon Dry - Pump + Bubbler O.K.

Check 24.7%, down .4% - Adj span Pot ½ Right

Optics 2260-2270, up 10-2, adj. to 2270-2270

Range - High 1:1 Low 1:1

Zero Calib 22 5 4 2 0

NAME EXPERIMENT NO.

T-339 Wednesday 12-5-90

Woods HAI Range 0-40 ppb
Flow Steady @ 3.0; Chart O.K. - Replaced Lead Acetate
Tygon Dry - Filled Bubbler - Pump O.K
Check Steady @ 20.4 %
Optics 1620-1630, up 10 ea. Adj. to 1630-1630
Range - High 1:1 Low 1:1
Zero Calib 23 4 5 0

Woods Met
Operating Normally - Chart O.K
TP H-T
Operating Normally - Chart + Both O.K.
SOH-1 Met
Operating Normally - Chart O.K

Gilman HAI Range 0-30 ppb
Flow steady @ 3.0, Chart O.K. - Replaced Lead Acetate
Drained Tygon - Pump + Bubbler O.K
Check 27.1 %, up 2.4 %
Optics Steady @ 2220-2240
Range: High 1:1 Low 1:1
Zero Calib 25 5 1 0

SOH-1 HAI Range 0-30 ppb
Flow Steady @ 3.0, Chart O.K. - Replaced Lead Acetate
Tygon Dry - Pump + Bubbler O.K
Check Steady @ 24.7 %
Optics 2260-2270, up 10 ea, adj to 2270
Range - High 1:1 Low 1:1
Zero Calib 23 8 4 0 0

NAME EXPERIMENT NO.

J-341 Friday 12-7-90

Woods HAI Range 0-2 ppb

Flow Steady @ 3.0; chart + Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check Steady @ 20.4°

Optics Steady @ 1630-1630

Range- High 1:1 Low 1:1

Zero Calib 19 5 1 0

Woods Met

Operating Normally - Renewed Chart

T.P. Met

Operating Normally - Renewed Chart - Batt OK

50M-1 Met

Operating Normally - Chart OK

Gilman HAI Range 0-2 ppb

Flow Steady @ 3.0, Chart + Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check 12.0°, up .1°

Optics 2080-2070, down 10-, No Adj

Range- High 1:1 Low 1:1

Zero Calib 19 4 3 0 0

Span Calib - Exp 50 50 50 50 50 } No Adj

Act 27 37 47 51 50 }

50M-1 HAI Range 0-2 ppb

Flow Steady @ 3.0, Chart + Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check Steady @ 27.1°

Optics 2770-2780, up 10-, Adj To 2780-2780

Range- High 1:1 Low 1:1

Zero Calib 26 9 2 0

Colontec

Replaced Colontec Cards - No Visible Color Change

NAME EXPERIMENT NO.

J-344 Monday 12-10-90

Woods HAI Range 0-2 ppb

Flow steady @ 3.0, chart + Lead Acetate O.K

Typoon Dry - Pump + Bubbler O.K

Check 20.2%, down .2%

Optics steady @ 1630-1630

Range - High 1:1 Low 1:1

Zero Calib 19 8 2 2

Woods Met

Operating Normally - chart O.K

T.P. Met

Operating Normally - chart O.K

SOS-1 Met

Operating Normally - chart O.K

Gilman HAI Range 0-2 ppb

Flow steady @ 3.0, chart + Lead Acetate O.K

Typoon Dry - Pump + Bubbler O.K

Check 18.0%, steady

Optics 2080-2040, down 40 -, adj to 2040-2040

Range - High 1:1 Low 1:1

Zero Calib 17 6 0 0 2

SOS-1 HAI Range 0-2 ppb

Flow steady @ 3.0, chart + Lead Acetate O.K

Drained Typoon - Cleaned Sample Chamber - Pump + Bubbler O.K

Check 27.2%, up .1%

Optics 2280-2270, down 10 -, No Adj.

Range - High 1:1 Low 1:1

Zero Calib 25 4 1 0

Span Calib - Exp 50 50 50 50 (40: span) 50

Act 19 33 47 49 (BTK Right) 50

NAME EXPERIMENT NO.

J-346 Wednesday 12-12-90

Woods HAI Range 0-2ppb

Flow steady @ 3.0, Renewed Chart, Lead Acetate OK

Tygon Dry - Pump & Bubbler OK

Check 20.4%, up .2%

Optics Steady @ 1630-1650

Range- High 1:1 Low 1:1

Zero Calib 10 5 1 0

Woods Met

Operating Normally - Renewed Chart

TD Met

Operating Normally - chart & Batt OK

SOH-1 Met

Operating Normally - Renewed Chart

Gilman HAI Range 0-3ppb

Flow Steady @ 3.0, Renewed chart, Lead Acetate OK.

Tygon Dry - Pump & Bubbler OK

Check 17.5%, down .5%

Optics Steady @ 2050-2050

Range High 1:1 low 1:1

Zero Calib 18 2 1 [Zero, Rpt] 0

SOH-1 HAI Range 0-100ppb

Flow steady @ 3.0, Renewed Chart, Lead Acetate OK

Tygon Dry - Pump & Bubbler OK

Check 30.1%, up 2.4%

Optics 2270-2170, down 100 - adj to 2170-2170

Range- High 1:1 low 1:1

Zero Calib 22 2 2-0 0 (Flow, Rpt, Rpt) 0

NAME EXPERIMENT NO.

J-348 Friday 12-14-90

Wood-HAI Range Ø-2ppb

Flow adj to 3.0 from 2.8, Chart + lead Acetate O.K.

Drained Tygon - Pump + Bubbler O.K.

Check 20.4%, Steady

Optics 1630-1660, up 30 ~, adj to 1660-1660

Range High 1:1 Low 1:1

Zero Calib 17 5 3 Ø

Span Calib - Exp 50 50 50 50 (span Pot 1/4 Right) 50

Act 29 31 45 48 50

Woods Met

Operating Normally - Removed Chart

T.C. Met

Chart Jammed some data lost - Replaced Chart - Batt OK @ 12.5

SOH-Met

Operating Normally - Removed Chart

~~SOH-1 HAI~~ Gilman HAI Range Ø-3ppb

Flow Steady @ 3.0, Chart + lead Acetate OK

Tygon Dry - Pump + Bubbler O.K.

Check Steady @ 17.5%

Optics 2050-2040, down 10 ~, No Adj.

Range: High 1:1 Low 1:1

Zero Calib 17 5 2 1 Ø (2 one for 1/4 Left)

SOH-1 ~~Met~~ HAI Range Ø-2ppb

Flow Steady @ 3.0 Chart + lead Acetate OK

Tygon Dry - Filled Bubbler - Pump O.K.

Check 30.4%, up 3%

Optics 2180-2190, ~~down~~ up 10 ~, Adj to 2190-2190

Range - High 1:1 Low 1pp Low, adj for 1:1

Zero Calib 28 6 1 Ø

Colortec

Replaced Colortec Cards - No Visible Color Change

NAME EXPERIMENT NO.

J-351 Monday 12-17-90

Woods HAI Range 0-3 ppb

Flow steady @ 3.0, Chart + Lead Acetate OK

Drain/Tygon - Filter Bubbler - Pump OK

Check 21.1%, up .1%

Optics 1670-1650, down 20 ea, Adj to 1650-1650

Range High 1:1 Low 1:1

Zero Calib 20 0 1 0

Woods M-H

Operating Normally - No Temp or RH - Chart OK

IC Met

Operating Normally - Chart + Batt OK

SOH-1 H-H

Operating Normally - Chart OK

Gilmon HAI Range 0-3 ppb

Flow Steady @ 3.0, Chart + Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check 17.9%, up .4%

Optics 2050-2080, up 30 ea, adj to 2080-2080

Range- High 1:1 Low 1:1

Zero Calib 12 5 2 1 (Zero Pot Full Left) 0

Span Calib - Exp 50 50 50 50 50

Act 38 42 47 49 50

SOH-1 HAI Range 0-20 ppb

Flow adj to 3.0 From 2.8, Chart + Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check Steady @ 30-4%

Optics 2200-2230, up 30 ea, adj to 2230-2230

Range - High 1:1 Low 1:1

Zero Calib 29 5 3 0 (Zero Pot Full Right) 0

NAME EXPERIMENT NO.

J-353 Wednesday 12-19-90

Woods HAI Range 0-3ppb
Flow steady @ 3.0, Removed Chart - Replaced Lead Acetate
Tygon Dry - Pump & Bubbler OK
Check Steady @ 21.1°
Optics 1640-1620, down 20 ea. Adj. to 1620-1620
Range - High 1:1 Low 1:1
Zero Calib 18 5 2 0

Woods Hot
Operating Normally - Replaced Chart
J.P. Hot
Operating Normally - Chart + Batt OK
SOH-1 Hot
Operating Normally - Replaced Chart

Gilman HAI Range 0-3 ppb
Tygon Dry - Pump & Bubbler OK
Flow Steady @ 3.0. Removed Chart - Replaced Lead Acetate
Tygon Dry - Pump & Bubbler OK
Check 29.8°, down .6°
Optics Steady @ 2210-2210
Range High 1:1 Low 1:1
Zero Calib 28 4 2 1 (Zero Air) 0

SOH-1 HAI. Range 0-3ppb
Flow Steady @ 3.0, Replaced Chart, Replaced Lead Acetate
Tygon Dry - Pump & Bubbler OK
Check 17.8°, down .1°
Optics 2050-2030, down 20 ea, adj to 2030-2030
Range - High 1:1 Low 1:1
Zero Calib 14 -0 2 0

NAME EXPERIMENT NO.

T-355 Friday 12-21-90

Woods HAI Range 0-2 ppb
Flow steady @ 3.0, chart + Lead Acetate O.K.
Tygon Dry - Pump + Bubbler O.K.
Check 21.5%, up .4%
Optics 1640-1670, up 30 ea, adj to 1670-1670
Range - High 1:1 Low 1:1
Zero Calib 1 4 0 0

Woods Met
Operating Normally - Renewed Chart
T.P. Met
Temp sensor failed - Chart Jammed - Some Data lost.
Renewed Chart - Batt O.K.
SOM-1 Met
Operating Normally - Chart O.K.

Gilman HAI Range 0-2 ppb
Flow steady @ 3.0, Chart + Lead Acetate O.K.
Drained Tygon - Filled Bubbler - Pump O.K.
Check 17.9%, up .1%
Optics 2040-2070 up 30 ea, adj to 2070-2070
Range - High 1:1 Low 1:1
Zero Calib 52 6 1 0

SOM-1 HAI Range 0-2 ppb
Flow steady @ 3.0, Chart + Lead Acetate O.K.
Check 30.0%, up .2%
Tygon Dry - Pump + Bubbler O.K.
Optics 2220-2240, up 20 ea, adj to 2240-2240
Range - High 1:1 Low 1:1
Zero Calib 21 1 2 0
Span Calib - Exp 50 50 50 50 50
Act 30 40 48 49 50

Colortec
Replaced Colortec Cards - No Color change visible.

NAME EXPERIMENT NO.

J-358 Monday 12-24-90

Woods HAT Range 0 - 3 ppb

Flow steady @ 3.0, chart + Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check 21.59 - Steady

Optics 1670 - 1660, down 10 ea. No Adj.

Range - High 1:1 Low 1:1

Zero Calib 15 9 2 0

Span Calib - Exp 50 50 50 50

Act 27 39 47 50

Woods Met

Operation Normally - Chart OK

IP Met

Inoperative - Chart Jammed - Repaired Better Replaced BAT

SOH-1 Met

Inoperative - Generator Shut Down - OFF Line till 1-3-91

Gilman HAT Range 0 - 3 ppb

Flow Steady @ 3.0, chart + Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check Steady @ 17.90

Optics 2080 - 2050, down 30 ea Adj to 2050 - 2050

Range - High 1:1 Low 1:1

Zero Calib 16 5 2 1 0

SOH-1 HAT

Inoperative - Generator Shut Down - OFF Line to 1-3-90

NAME EXPERIMENT NO.

J-360 Wednesday 12-26-90 Range 0-2 ppb
Flow steady @ 3.0, Replaced Chart - Lead Acetate OK
* Chart Badly Jammed - Lost Data
Tygon Dry - Filled Bubbler - Pump OK
Check 20.4%, down 1.1%
Optics 1670 - 1650, down 20 ea, Adj. to 1650 - 1675
Range - High 1:1 Low 1:1
Zero Calib 20 6 3 0

West Met
* Chart Jammed - Lost Data - Repaired Jam
TP-Met
* Chart Badly Jammed - Repaired Brake - Replaced Battery
SOH-1 Met
OFF-Line - No Power - Removed Chart

Gilman HAI Range - 0 - 3 ppb
Flow Steady @ 3.0, Renewed Chart - Lead Acetate OK
Tygon Dry - Pump & Bubbler OK
Check 17.6%, down .3%
Optics 2060 - 2050, down 10 ea, No Adj.
Range High 1:1 Low 1:1
Zero Calib 12 5 1 0

SOH-1 HAI
* Inoperative - No Power - OFF Line

NAME EXPERIMENT NO.

T-362 Friday 12-28-90

Woods HAI Range 0-2ppb

Flow steady @ 3.0, chart + lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check steady @ 20.4°C

Optics 1650-1640, down 10 =, No Adj:

Range- High 1:1 Low 1:1

Zero Calib 19 11 2 1 0

Woods Met

Operating Normally - Rewired Chart

TP Met

+ Chart Jammed Again - Adjusted Brake - Rewired Chart - Ran OK @ 12.4°C

SOH-1 Met

* Inoperative - OFF Line -

Gilmen HAI Range 0-3ppb

Flow steady @ 3.0, chart + lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check 17.3%, down .3%

Optics 2070-2060, down 10 =, No Adj:

Range- High 1:1 Low 1:1

Zero Calib 6 14 6 2 0

SOH-1 HAI

+ Inoperative - off line

Colontec

Replaced Colontec Cards - No Visible Color change.

NAME EXPERIMENT NO.

J-365 Monday 12-31-90

Woods HAI Range 0-2ppb

Flow steady @ 3.0, chart & Lead Acetate OK

Tygon Dry - Pump & Bubbler OK

Check 20.6%, up .2%

Optics 1540-1630, down 10 ~, No Adj.

Range High 1:1 Low 1:1

Zero Calib 8 9 -0 -0 (zero Pot / 10 Right) 0

Woods Met

Operating Normally - Chart OK

T.P. Met

Operating Normally - Chart & Battery OK

SOH-1 Met

Off Line

Gilman HAI Range 0-3ppb

Flow steady @ 3.0, chart & Lead Acetate OK

Tygon Dry - Pump & Bubbler OK

Check steady @ 17.3%

Optics 2080-2040, down 40 ~, adj to 2040-2040

Range - High 1:1 Low 1:1

Zero Calib 19 5 2 0

SOH-1 HAI

Off Line - No Power - Rig shut down

DAILY AVERAGE, MAXIMUM AND TOTAL H2S READINGS

December 1 To December 31, 1990

	Gilman			SOH-1			Woods		
Date	Avg	Max	Total	Avg	Max	Total	Avg	Max	Total
1201	1	3	32	1	2	19	2	3	44
1202	2	3	36	1	2	15	2	3	45
1203	1	2	14	1	2	22	2	4	43
1204	1	2	19	1	2	23	1	3	28
1205	1	3	24	1	2	31	1	3	28
1206	1	2	21	1	2	27	1	2	17
1207	1	3	25	1	2	27	1	2	18
1208	1	1	15	1	2	25	1	1	13
1209	1	2	15	1	2	19	1	1	16
1210	1	2	28	1	2	14	0	2	11
1211	1	3	34	1	2	20	1	2	15
1212	1	2	28	1	2	18	1	2	22
1213	1	2	31	1	2	19	1	1	18
1214	1	2	20	1	2	27	1	2	24
1215	1	2	22	1	2	32	1	2	20
1216	1	2	21	1	2	30	1	3	31
1217	1	2	18	1	2	27	1	1	16
1218	1	2	22	1	3	32	1	2	26
1219	1	2	21	2	3	37	1	2	29
1220	1	2	24	1	2	30	2	2	38
1221	1	2	25	1	2	26	2	2	36
1222	1	2	27	0	1	3	2	10	51
1223	1	3	24	-	-	-	1	2	26
1224	1	2	29	-	-	-	1	2	15
1225	1	3	29	-	-	-	-	-	-
1226	1	3	33	-	-	-	1	2	14
1227	2	3	45	-	-	-	1	3	27
1228	2	4	45	-	-	-	1	2	27
1229	2	3	36	-	-	-	1	2	28
1230	1	3	26	-	-	-	1	3	35
1231	2	3	43	-	-	-	2	3	41
	1	4	832	1	3	523	1	10	802

All readings are in parts per billion (ppb)

H2S CHART REDUCTION -- SOH-1 Station

From 12-1-90 to 12-31-90

HOUR:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Avg	Max	Total
1201	1	1	0	0	0	1	1	1	2	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	2	19
1202	0	0	1	1	1	0	0	0	1	1	1	2	1	1	1	0	0	0	1	2	1	0	0	0	1	2	15
1203	0	0	0	0	1	0	1	0	1	1	1	1	2	1	2	1	1	2	2	2	1	1	1	0	1	2	22
1204	0	1	1	0	1	0	0	1	2	2	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	2	23
1205	0	1	0	1	1	0	0	1	2	2	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	2	31
1206	1	1	1	0	1	0	0	1	1	1	1	2	2	2	2	2	1	2	2	2	1	0	1	0	1	2	27
1207	0	0	0	0	0	0	1	1	1	1	1	1	2	1	2	2	2	2	1	2	2	1	2	2	1	2	27
1208	1	1	1	1	1	0	0	1	1	1	0	1	1	1	1	2	2	2	2	1	1	2	1	0	1	2	25
1209	1	1	1	1	1	0	1	1	1	1	1	1	2	1	0	0	0	0	1	1	1	1	1	0	1	2	19
1210	0	0	0	0	0	0	0	0	0	1	0	1	2	2	2	1	2	1	0	1	1	0	0	0	1	2	14
1211	0	0	1	1	1	0	0	0	1	1	1	1	2	2	2	2	1	1	0	1	0	1	1	0	1	2	20
1212	0	0	1	1	1	1	1	0	0	1	0	1	1	1	1	2	1	1	1	0	1	1	1	0	1	2	18
1213	1	1	1	1	1	0	0	0	1	0	0	1	1	1	2	2	2	2	1	1	0	0	0	0	1	2	19
1214	0	0	1	1	1	0	0	0	1	2	1	1	1	1	1	2	2	2	1	1	2	2	2	2	1	2	27
1215	1	2	2	2	1	2	2	2	2	1	0	1	1	1	1	0	1	1	1	2	2	2	1	1	1	2	32
1216	2	2	2	2	2	2	1	1	0	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	30
1217	1	1	0	0	0	0	1	1	0	1	2	2	2	2	2	2	2	1	1	1	2	1	1	1	1	2	27
1218	1	2	1	2	2	3	3	2	2	1	1	2	1	0	1	1	2	2	2	1	0	0	0	0	1	3	32
1219	2	3	2	2	2	1	2	2	2	3	2	2	2	1	1	1	1	1	1	0	0	0	2	2	2	3	37
1220	2	2	1	1	2	2	2	1	1	1	0	0	0	2	2	2	2	1	1	1	0	1	1	2	1	2	30
1221	2	2	1	1	1	0	0	1	1	1	1	2	2	1	2	1	1	2	1	0	0	1	1	1	1	2	26
1222	1	1		**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	0	1	3
1223	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	0	0	0
1224	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	0	0	0
1225	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	0	0	0
1226	**	**	**	**	**	**	**	**	**	**	**	*	**	**	**	**	**	**	**	**	**	**	**	**	0	0	0
1227	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	0	0	0
1228	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	0	0	0
1229	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	0	0	0
1230	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	*	**	**	**	0	0	0
1231	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	0	0	0
																											523
AVG.	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0*	1		
MAX.	2	3	2	2	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2		3	

**=Power or Equip. failure: *=Calibration

	Supplementary Billing	HOURS	MATERIAL
J-337	Monday, 12-3-90	2.00	
	SOH-1 Pen ran dry. Some data lost. POMERINCK Sound meter batteries dead. Some data lost. LOUGHLIN Pen ran dry. Some data lost.		
J-339	Wednesday, 12-5-90	2.00	
	SOH-1 Pen ran dry again. Lost some data. POMERINCK Second set of meter batteries dead. Replaced. Some data was lost. LOUGHLIN Pen ran dry again. Some data was lost.		
J-341	Friday, 12-7-90	4.00	
	SOH-1 Inoperative. Sound meter failed. Replaced meter with Loughlin's meter. Full calibration. POMERINCK Operating normally. Full calibration. LOUGHLIN Operating normally. Removed sound meter for installation at SOH-1. Station now off-line.		
J-344	Monday, 12-10-90	2.00	10.50
	SOH-1 Operating normally. Shipped meter to Quest. POMERINCK Pen ran dry. Some data lost. LOUGHLIN Off-line.		
J-346	Wednesday, 12-12-90	2.00	
	SOH-1 Pen ran dry again. Some data lost POMERINCK Operating normally. LOUGHLIN Off-line.		
J-348	Friday, 12-14-90	3.00	201.75
	SOH-1 Operating normally. Full calibration. POMERINCK Operating normally. Full calibration. LOUGHLIN Off-line. COLORTEC Replaced colortec cards. No visible color change. Purchased additional charts for H2S analyzer and for the Met stations due to contract extention.		

J-351	Monday, 12-17-90 SOH-1 Pen ran dry. Some data lost. POMERINCK Operating normally. Replaced main battery. LOUGHLIN Off-line	2.00	
J-353	Wednesday, 12-19-90 SOH-1 Chart badly jammed. Some data lost. Heavily sprayed interior of instrument shelter with roach spray. POMERINCK Operating normally. Replaced meter batteries.	2.00	3.50
J-355	Friday, 12-21-90 SOH-1 Operating normally. Full calibration. POMERINCK Operating normally. Full calibration LOUGHLIN Off-line. COLORTEC Replaced colortec cards. No visible color change.	3.00	
J-358	Monday, 12-24-90 SOH-1 Inoperative. No Power. Rig shut down. Off-line. POMERINCK Operating normally. Replaced main battery. LOUGHLIN Off-line.	2.00	
J-360	Wednesday, 12-26-90 SOH-1 Off-line. POMERIINCK Chart badly jammed. Some data lost. Repaired. LOUGHLIN Off-line.	1.00	
J-362	Friday, 12-28-90 SOH-1 Off-line POMERINCK Operating normally. Full calibration of Meter and recorder. LOUGHLIN Off-line COLORTEC Replaced colortec cards. No visible color change.	2.00	
J-365	Monday, 12-31-90 SOH-1 Off-line. Drill rig still shut down. POMERINCK Some data lost due to battery failure. Replaced batteries and restored operation. LOUGHLIN Off-line. Awaiting meter return from repair depot.	1.00	

Meteorology Station Log
SOH-1
12-1-90 to 12-31-90

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	1201		1202		1203		1204	
0000	360	2	285	2	280	2	205	2
0100	360	2	285	2	275	2	285	2
0200	310	2	280	2	275	2	275	2
0300	280	2	285	2	260	2	270	2
0400	290	2	290	2	275	2	265	3
0500	305	3	295	2	270	3	275	3
0600	295	3	285	2	290	3	280	3
0700	275	4	275	2	275	4	290	3
0800	280	4	265	3	295	3	290	4
0900	300	4	270	4	280	2	310	4
1000	325	5	300	3	320	4	340	6
1100	10	6	315	2	25	4	25	6
1200	40	6	70	3	50	5	30	7
1300	45	5	40	4	50	6	40	8
1400	35	5	55	4	45	7	40	7
1500	25	5	60	4	45	5	25	6
1600	330	4	50	4	35	4	20	5
1700	310	3	355	3	20	2	35	4
1800	310	3	335	2	5	2	25	4
1900	65	2	310	2	330	3	20	4
2000	295	2	305	2	315	2	10	3
2100	315	3	270	3	310	2	350	3
2200	270	2	90	2	290	2	300	2
2300	280	2	275	2	290	2	305	3

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	1205		1206		1207		1208	
0000	295	3	260	4	50	2	280	2
0100	315	3	270	3	50	2	310	2
0200	300	3	275	3	50	2	275	2
0300	295	3	275	2	50	2	275	3
0400	310	3	280	2	50	2	285	3
0500	300	3	280	2	50	2	280	2
0600	295	4	280	2	50	2	290	2
0700	290	3	275	3	50	2	290	4
0800	320	4	285	3	50	2	275	3
0900	325	5	320	3	330	2	310	4
1000	340	6	25	5	40	3	325	4
1100	360	7	45	5	50	4	360	5
1200	10	8	40	5	55	5	30	5
1300	15	8	50	5	50	6	35	7
1400	30	8	65	4	60	6	40	6
1500	40	7	45	4	45	5	340	5
1600	355	5	50	3	45	4	360	4
1700	350	4	50	2	35	3	30	4
1800	310	3	50	2	30	2	35	4
1900	310	4	50	2	45	2	35	5
2000	280	5	50	2	40	2	30	6
2100	275	4	50	2	45	2	35	6
2200	270	4	50	2	50	2	30	5
2300	275	4	50	2	330	2	40	5

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	1209		1210		1211		1212	
0000	55	6	50	7	45	2	285	4
0100	45	3	50	6	50	2	45	2
0200	25	2	45	6	50	3	340	2
0300	40	5	40	6	295	3	300	4
0400	40	6	25	4	275	2	345	3
0500	45	7	45	5	285	3	360	4
0600	65	6	45	5	260	3	310	3
0700	50	8	45	4	280	3	295	2
0800	50	8	45	4	320	4	290	2
0900	45	10	40	5	40	5	290	3
1000	60	12	45	8	35	4	45	6
1100	55	11	50	8	55	5	55	5
1200	60	10	60	8	50	6	70	7
1300	65	8	65	8	70	6	80	4
1400	75	7	55	9	65	7	55	3
1500	55	8	55	9	65	8	75	4
1600	65	9	50	8	60	7	55	4
1700	60	9	50	6	50	5	335	3
1800	55	10	45	4	60	4	45	4
1900	60	9	50	6	55	5	60	4
2000	60	9	45	4	60	6	75	7
2100	55	8	40	3	35	3	65	6
2200	55	7	45	4	300	2	80	6
2300	45	7	45	5	60	2	80	4

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	1213		1214		1215		1216	
0000	75	5	45	5	280	3	95	3
0100	85	4	45	3	280	3	70	3
0200	65	5	340	2	275	2	70	3
0300	80	6	310	3	270	2	100	3
0400	90	5	300	3	290	2	155	3
0500	90	4	335	4	275	2	130	4
0600	85	4	55	7	265	2	120	3
0700	70	6	80	8	40	2	120	3
0800	75	7	85	8	265	2	145	3
0900	80	7	85	9	260	2	150	4
1000	60	7	75	8	225	2	150	4
1100	55	8	85	6	275	3	155	4
1200	65	8	80	7	70	5	120	2
1300	60	8	75	7	85	4	100	3
1400	60	8	70	7	90	3	85	4
1500	60	7	90	6	80	3	90	5
1600	55	6	75	6	90	3	105	4
1700	55	5	85	4	95	3	80	3
1800	50	5	80	4	105	2	80	3
1900	45	4	65	5	115	2	90	3
2000	50	4	80	4	110	2	100	3
2100	45	6	90	3	80	2	95	2
2200	50	5	60	2	145	2	75	2
2300	50	7	65	2	150	3	90	2

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	1217		1218		1219		1220	
0000	90	2	140	2	295	4	310	3
0100	105	2	220	2	290	4	300	3
0200	90	2	285	2	305	4	285	4
0300	105	3	285	2	280	4	275	4
0400	115	2	295	2	285	4	275	4
0500	115	2	290	2	285	4	280	3
0600	110	3	295	3	280	4	280	4
0700	110	3	275	3	275	4	275	4
0800	110	3	280	3	295	4	280	4
0900	90	3	285	4	280	5	280	4
1000	95	4	310	4	300	6	270	4
1100	100	4	325	5	355	6	310	3
1200	115	5	350	4	295	5	345	4
1300	110	5	50	3	310	5	350	4
1400	105	4	345	4	345	4	45	3
1500	100	3	20	6	340	4	350	4
1600	100	3	45	13	330	5	340	2
1700	80	3	50	11	20	5	295	3
1800	60	2	35	7	40	6	290	4
1900	55	2	320	8	15	4	290	4
2000	340	2	290	6	350	4	285	3
2100	280	3	280	5	315	5	295	3
2200	260	2	275	4	320	5	290	2
2300	130	2	290	4	315	4	280	2

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	1221		1222		1223		1224	
0000	275	2	20.	3	-	-	-	-
0100	270	2	175	3	-	-	-	-
0200	260	2	-	-	-	-	-	-
0300	265	2	-	-	-	-	-	-
0400	270	2	-	-	-	-	-	-
0500	215	2	-	-	-	-	-	-
0600	150	2	-	-	-	-	-	-
0700	200	3	-	-	-	-	-	-
0800	180	2	-	-	-	-	-	-
0900	135	2	-	-	-	-	-	-
1000	135	2	-	-	-	-	-	-
1100	80	3	-	-	-	-	-	-
1200	90	3	-	-	-	-	-	-
1300	140	3	-	-	-	-	-	-
1400	95	3	-	-	-	-	-	-
1500	90	2	-	-	-	-	-	-
1600	80	2	-	-	-	-	-	-
1700	210	3	-	-	-	-	-	-
1800	250	3	-	-	-	-	-	-
1900	255	2	-	-	-	-	-	-
2000	160	2	-	-	-	-	-	-
2100	135	2	-	-	-	-	-	-
2200	130	2	-	-	-	-	-	-
2300	170	2	-	-	-	-	-	-

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	1225		1226		1227		1228	
0000	–	–	–	–	–	–	–	–
0100	–	–	–	–	–	–	–	–
0200	–	–	–	–	–	–	–	–
0300	–	–	–	–	–	–	–	–
0400	–	–	–	–	–	–	–	–
0500	–	–	–	–	–	–	–	–
0600	–	–	–	–	–	–	–	–
0700	–	–	–	–	–	–	–	–
0800	–	–	–	–	–	–	–	–
0900	–	–	–	–	–	–	–	–
1000	–	–	–	–	–	–	–	–
1100	–	–	–	–	–	–	–	–
1200	–	–	–	–	–	–	–	–
1300	–	–	–	–	–	–	–	–
1400	–	–	–	–	–	–	–	–
1500	–	–	–	–	–	–	–	–
1600	–	–	–	–	–	–	–	–
1700	–	–	–	–	–	–	–	–
1800	–	–	–	–	–	–	–	–
1900	–	–	–	–	–	–	–	–
2000	–	–	–	–	–	–	–	–
2100	–	–	–	–	–	–	–	–
2200	–	–	–	–	–	–	–	–
2300	–	–	–	–	–	–	–	–

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	1229		1230		1231			
0000	–	–	–	–	–	–		
0100	–	–	–	–	–	–		
0200	–	–	–	–	–	–		
0300	–	–	–	–	–	–		
0400	–	–	–	–	–	–		
0500	–	–	–	–	–	–		
0600	–	–	–	–	–	–		
0700	–	–	–	–	–	–		
0800	–	–	–	–	–	–		
0900	–	–	–	–	–	–		
1000	–	–	–	–	–	–		
1100	–	–	–	–	–	–		
1200	–	–	–	–	–	–		
1300	–	–	–	–	–	–		
1400	–	–	–	–	–	–		
1500	–	–	–	–	–	–		
1600	–	–	–	–	–	–		
1700	–	–	–	–	–	–		
1800	–	–	–	–	–	–		
1900	–	–	–	–	–	–		
2000	–	–	–	–	–	–		
2100	–	–	–	–	–	–		
2200	–	–	–	–	–	–		
2300	–	–	–	–	–	–		